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DIFFUSIONS AND BARRIERS OF TECHNOLOGY-AIDED DELIVERY OF ENABLERS IN ELEMENTARY SCHOOLS IN THE DISTRICT OF CUARTERO

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ABSTRACT

Many school districts support technological advances in the classroom by giving gadgets such as tablets and computers, moving forward web networks, and actualizing programs planned to move forward with ease of use. The study aimed to determine the level of diffusions and barriers of technology-aided delivery of enablers in the District of Cuartero for the school year 2023-2024. A validated and reliability tested researcher-made questionnaire was used to gather the needed data from randomly selected respondents. The statistical tools used to analyze and interpret data were frequency count, percentage, mean, t- test, analysis of variance, and Pearson-r. Findings of the study revealed that the level of diffusions of technology-aided delivery of enablers as a whole was very high. The extent of barriers of technology-aided delivery of enablers was high. There were no significant differences in the level of diffusions of technology-aided delivery of enablers when grouped according to sex, and number of ICT training attended except age and salary were significantly difference existed. There were no significant differences in the extent of barriers of technology-aided delivery of enablers when grouped according to sex, age, and salary except number of ICT trainings attended which showed significant difference. And the level of diffusions is significantly related to the extent of barriers of technology-aided delivery of enablers in the District of Cuartero. Teachers need to enrich further their digital competencies for the betterment and improvement of their teaching process.

KEYWORDS: *Diffusions, Barriers, Technology-Aided Delivery, Enablers*

Introduction

Many school districts support technological advances in the classroom by giving gadgets such as tablets and computers, moving forward web networks, and actualizing programs planned to move forward with ease of use. In spite of the fact that teachers frequently appreciate the benefits of educational innovation, they regularly battle to coordinate modern educational innovations viably and easily. From acquiring modern innovation gear to adjusting educational programs and educating strategies to join modern teaching devices, innovation integration poses critical challenges for teachers at all levels within the classroom.

In Botswana, information and communications technology (ICT) is broadly utilized over the nation and individuals are progressively mindful of the integration of ICT in instruction. Numerous schools have embraced and actualized numerous activities to present technology-assisted teaching in their instruction framework. Also, the government has propelled activities to support the selection and integration of innovation within the instruction system. Thus, innovative support within the educating and learning environment will offer

assistance to shape learners from childhood until adulthood, when they are competent to enter the work of advertisement (Republic of Botswana, 2015).

In the Philippines, integrating innovation in education and learning has become a major concern for numerous teachers. With its quick improvement, teachers look for ways to coordinate innovation in the learning process. Focusing on the advancement of the complete learner is the key to realizing the needs to create innovative curriculum guidelines for elementary and secondary schools in the Philippines. Teacher factors are directly related to technology integration in terms of usage, attitudes, and enabling conditions. At the same time, the expertise factor reflects a more authentic relationship with technological integration. Therefore, permissions and instructions for use are also factors that directly affect the success of technology integration. Therefore, these guidelines require adequate support, including training and time, to deploy the technology for personal and professional purposes (Bonifacio, 2020).

With the thrust of Department of Education (DepEd) to develop a citizenry who are technologically at far with other developed and developing nations, it is equated to have educators who are capable of using innovations brought about by the advancement of Science. The Information and Communication Technology is a tool that helps Technology and Livelihood Teachers "sell their goods" to their learners. The utilization of ICT in teaching methodology contributes to positive student learning outcomes if properly utilized inside the classroom. The effectiveness of this teaching tool lies in the hand of educators who will implement and instruct students on its use.

In Roxas City, Capiz, the study of Alejandro (2021) indicated that the level of technology-aided instruction in the Division of Roxas City was excellent in terms of knowledge, skills, and resources. The results implied that teachers were very highly knowledgeable, skillful, resourceful, and abreast with the latest technologies which could be used as instructional tools. At all times, teachers facilitated learning with the use of technologies. Teachers were able to cope with the current needs of the students in a technology-driven era of learning. Students had become more critical of the delivery of classroom instruction and become more selective in the reception of the learning content. The utilization of technology in classroom created enthusiasm among the students about the subjects which enable them to relate these lessons to everyday life. The utilization of modern technologies in teaching improved the teachers' performance, thus, increased their productivity.

The researcher's experience as a public elementary school teacher motivated her to conduct this study, to find out the impact of diffusion and barriers of technology-aided delivery of enablers in elementary schools in the District of Cuartero. The reason for this study is to characterize the diffusions and barriers of technology- aided delivery of enablers into instruction; to investigate the availability of technology; and to understand the common picture of the technology-aided delivery of instruction.

The conceptual framework of the study was anchored on the Theory of Reasoned Action (TRA) concerning the key factors in the diffusions and barriers of technology-aided delivery of enablers in elementary school. The given schematic diagram outlined how all variables of the study (including all their components as indicated in the boxes) were described. Also, differences on the components of every dependent variable were established using the components of the independent variable, hence the line connections among boxes of the variables were established. The line between the two dependent variables showed how significant was the correlation of the said variables to each other. Therefore, the independent variable assumed to be the cause, while the dependent variables were the effects.

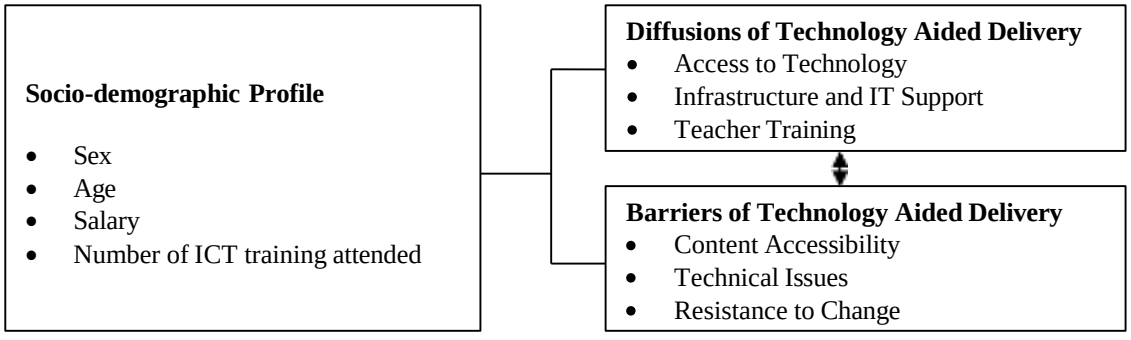

Figure 1. Schematic diagram showing the framework of the study.

Methods

This study aimed to investigate the diffusions and barriers of technology-aided delivery of enablers in elementary schools in the District of Cuartero for the school year 2023-2024. The participants of the study were the 177 out of 210 public elementary school teachers in the District of Cuartero for the school year 2023-2024.

They were chosen using random sampling.

The study was limited to the socio-demographic profile of the respondents such as sex, age, salary, and number of ICT training attended as independent variables, while the diffusions of technology-aided delivery in terms of access to technology, infrastructure and IT support, and teachers training and the barriers of enablers in technology-aided delivery in terms of content accessibility, technical issues, and resistance to change as the dependent variables. The study used the descriptive-correlational design.

The main instrument in data gathering was the researcher-made survey questionnaire for the teachers. The teachers' questionnaire was divided into three parts, namely socio-demographic profile, diffusion and barriers of technology-aided delivery questionnaires. Moreover, the researcher administered the survey questionnaire to the participants, and then the respondents were given duplicates of the approved instrument, with the confirmation that their answers were treated with confidentiality. Furthermore, in order to obtain a high rate of return, the researcher retrieved them personally after completion. After the surveys were assembled, the data were analyzed using frequency, percentage, mean, t-test, ANOVA and Pearson r. All statistical data were organized in Microsoft Excel and processed utilizing the Statistical Package for Social Science Software (SPSS), scored, and given corresponding verbal interpretations.

Results and Discussion

Level of Diffusions of Technology-Aided Delivery as a Whole

The result of the level of diffusions of technology-aided delivery as a whole is shown in Table 1. It presents the descriptive statistics of the level of diffusions of technology-aided delivery in terms of teachers' training, access to technology, and infrastructure and IT supports.

Table 1
Level of diffusions of technology-aided delivery as a whole.

Component	Mean	Verbal Interpretation
Teachers' Training	4.40	Very High
Access to Technology	4.37	Very High
Infrastructure and IT Supports	4.32	Very High
Grand Mean	**4.36**	**Very High**

NOTE: Components are presented from highest to lowest.

The results on the level of diffusions of technology-aided delivery when grouped as a whole had a grand mean of 4.36 verbally interpreted as "very high". Of the components, teachers' training had a mean of 4.40, access to technology had a mean of 4.37, and infrastructure and IT supports had mean of 4.32. All components were interpreted as "very high" meaning that the condition of the statements had far exceeded expectations. They were delivered exceptionally in an exceedingly manner all the time. The findings imply that there is a very high level of diffusions of technology-aided delivery among enablers. It helps the skills and ability of teachers in utilizing technology as a tool in their teaching instruction. It can be said that the very high level of teachers' diffusions on technology may be attributed to their frequent attendance in the ICT trainings and workshops. It can be said also that their schools are accessible in the internet provider and have enough computer laboratory and IT instructors. The present study is parallel to the findings of Wu et al. (2015) which states that teachers play an imperative part in the process of diffusion of innovation. In the attempt to attain the diffusion of a curricular innovation from one seeding school to five other schools, it had examined the learning of a gathering of teachers through an across-schools collaborative seeding travel. A reflective learning show for teachers is proposed with the point of preparing seeded teachers in reflection-for-action and constructing their capacities in planning and sanctioning the curriculum. In this paper, it investigated its adequacy, particularly with respect to teachers' recognition of the development and their buy-in. It was found that the seeded teachers from the five schools, notwithstanding their own teaching profiles and school settings, had obtained high degrees of buy-in to the development and created their preparation towards usage for the following stage. It was

imagined that such a learning show would illuminate the design for instructor proficiency improvement and accomplish advancement diffusion to make a more extensive community practice of educators. Likewise, Yilmaz (2017), stated that the utilization of technology in schools has encouraged worldwide collaboration in integrating ICT into learning. The trade of ideas is exceedingly esteemed, basically on investigating the viability of ICT for teachers. In school, learners gain more from presenting distinctive contraptions in their learning. Technology is fundamental for both teachers and learners since it encourages and advances superior understanding. The utilization of savvy boards is a great development in auxiliary schools and can be utilized for an assortment of purposes, including lesson arrangement.

Extent of Barriers of Technology-Aided Delivery as a Whole

The extent of barriers of technology-aided delivery as a whole and in terms of content accessibility, resistance to change, and technical issues is shown in Table 2.

Table 2
Extent of barriers of technology-aided delivery as a whole.

Component	Mean	Verbal Interpretation
Content Accessibility	4.43	Very High
Technical Issues	3.61	High
Resistance to Change	3.54	High
Grand Mean	**3.86**	**High**

NOTE: Components are presented from highest to lowest.

Result shows on the extent of barriers of technology-aided delivery in terms of content accessibility with an obtained mean score of 4.43, verbally interpreted as "very high". On the technological issues indicator of barriers of technology-aided delivery, it obtained a mean score of 3.61 verbally interpreted as "high". In terms of resistant to change, it obtained a mean score of 3.54, verbally interpreted as "high". Overall, the grand mean for the extent of barriers of technology-aided delivery was 3.86 verbally interpreted as "high". The verbally interpreted high mean scores indicate that the statements are often exhibited. Evidences can attest that it is normally manifested in an observable manner. The results imply that the high barriers of technology experienced by teachers may be due to lack of motivation to learn proper use of ICTs in the classroom. They are lack of skills needed for their ICT teaching. Moreover, they are lack of funds for training and seminar about ICT and lack of plan for the technology integration inside the classroom. However, it cannot be avoided that there is a problem that the teachers encountered in utilizing technology as an aid in their instruction. Thus, some of them are resistant to become equipped in utilizing technology as a tool in their instruction because they are old enough for change. According to Bai & Lo (2018) the utilization of technology is becoming progressively common in different instruction settings. Be that as it may, integrating innovation in teaching and learning is not without challenges. Students can presently get ready for lesson gatherings or indeed study independently outside utilizing electronic resources such as online video addresses. Information technology has played an imperative part in making strides in teaching and learning inside and outside the classroom. Results demonstrate that the lack of assets (e.g., innovative assets, resources, and arrangement time) as well as the lack of information and aptitudes in online learning practices are the two most frequently detailed barriers to technology integration in nearby schools. Moreover, according to Alsharief (2018), a study was conducted on preschool teachers' perceptions of barriers in integrating ICT into their future education practices in a Gulf nation on preschool teachers' self-confidence in teacher information technology infringement, their states of mind towards integrating ICT in instruction, their intentions towards integrating ICT into their future careers and assessing their educator training program in terms of planning for pre-service teachers utilizing ICT in their future teaching practices. Research results show that about half of the members are neither confident nor proposed to utilize ICT in their future education practice. However, the larger parts of them also have a positive demeanor towards ICT. Results appeared that there was a critical relationship between certainty and deliberation, with members having less certainty in ICT abilities in their educating hone and no proposal to utilize them in future instruction practice. Besides, there was a significant relationship between state of mind and certainty, with members accepting that utilizing ICT in teaching would result in way better learning outcomes for students. It may also be lack of access in the internet and wifi to use in the classroom or maybe they are lack of self-

confidence in performing ICT activities. Moreover, the study of Cahapay & Labrador (2021) describes barriers and enablers to distance learning during emergencies, from the perspective of teachers. The results show two main themes: 1.) barriers to emergency distance learning which includes internet connectivity and hardware issues; lack of understanding of distance instructional design; and 2.) lack of skills in using remote technology.

Differences in the Level of Technology-Aided Delivery when Respondents are grouped according to Selected Socio-Demographic Profile

To aid in the analysis and interpretation of data for problem statement nos. 3 an 4, the selected socio-demographic profile of the respondents were presented in Table 3.

Table 3
Socio-demographic profile of the respondents.

Variables	Respondents	Frequency	Percent
	Male	28	15.8
Sex	Female	149	84.2
		177	**100.0**
	23 years old and below	14	7.9
	24-30 years old	12	6.8
Age	31-40 years old	21	11.9
	41 years old and above	130	73.4
		177	**100.0**
	Below Php30,000	52	29.4
Salary	Php30,000-Php40,000	81	45.8
	Php40,001-Php50,000	24	13.6
	Above Php50,000	20	11.3
		177	**100.0**
Number of	None	76	42.9
ICT Training	1 to 2	48	27.1
Attended	5 and above	53	29.9
		177	**100.0**

Sex. The sex profile presented that out of 177 respondents, 149 (84.2%) were females and 28 (15.8%) were males. Findings revealed that majority of the respondents were females.

Age. The respondents' age profile showed that the age range of the respondents was from 23 to 41 years old and above. Results revealed that 130 (73.4%) were 41 years old and above, 21 (11.9%) were 31-40 years old, 14 (7.9%) were 23 years old and below, and 12 (6.8%) were 24-30 years old. This finding implies that most of the respondents are at the age bracket of 41 years old and above.

Salary. The salary of the respondents was shown in Table 4. It indicated that 81 (45.8%) earned a monthly salary of below Php30,000-Php40,000, 52 (29.4%) had below Php30,000, 24 (13.6%) had Php40,001- Php50,000, and 20 (13.6%) had above Php50,000. The findings imply that most of the respondents earned a monthly salary below Php30,000.

Number of ICT trainings attended**.** The respondents' number of ICT trainings attended illustrated that out of 177 respondents, 76 (42.9%) had not attended ICT training, 53 (29.8%) had attended 5 and above, and 48 (27.1%) had attended 1 to 2 ICT trainings. This shows that the highest percentage of the respondents have not attended ICT trainings at all.

The differences on the level of diffusions of technology-aided delivery when grouped according to selected socio-demographic profile are shown in Table 4.

Table 4
Differences in the level of diffusions of technology-aided delivery when they are grouped according to selected socio-demographic profile.

Socio-Demographic Profile	T/F Sig. Value	Significant Value	Probability
Sex	0.207	0.836	ns
Age	8.760	0.000	s
Salary	4.162	0.007	s
Number of ICT training attended	2.015	0.136	ns

p-value > 0.05 = not significant
p-value < 0.05 = significant

As shown in Table 5, data revealed that there was no significant difference in the level of diffusions of technology-aided delivery when respondents were grouped according to sex and number of ICT training attended, while significant difference in terms of age and salary were found. This means that the level of diffusions of technology-aided delivery did not depend on the respondents' sex and number of ICT training attended, but on their age and salary difference. Therefore, the null hypothesis which states that the level of diffusions of technology-aided delivery when they were grouped according to sex and number of ICT training attended is accepted while age and salary is rejected. It can be said that the younger respondents with high salary are more active in spreading and disseminating the technology-aided delivery than older respondents or vice versa. It might be that the younger teachers with high salary have enough exposure to the modern technology than their older counterparts. The younger teachers with high salary have more exposure and wide knowledge in digital technology because the creation and integration of using technology in teaching was from their generation.

The result of this study negates the study of Raman (2015) who found out that gender was considered as significant independent predictor of using technology-aided instruction. Male teachers exhibited higher usage of technology as substitute to their teaching compared to the female teachers. The result of this study agrees with the findings of Silvia (2016) that age difference is a significant factor in technology-aided instruction on teaching performance of secondary teachers implying that younger teachers frequently use technology in teaching compared to the older ones. The result of the study supports to the findings of Dintoe (2018) who stated that although University of Botswana implemented national ICT policies and trained the lecturers to use educational technology, there was low-level use of e-learning in teaching and learning. Findings from the study showed that early adopters experiences in pedagogies, use of technology, teachers compensations, qualification, and delivery of courses are different. The result of the study negates the findings of Ismail (2020), examined the Impact of training and experience in using technology on in-service teachers basic technology literacy. The study found that majority of the teachers had moderate basic new technology knowledge and skills, and perceived technology positively. Formal education, training and experience influence the teachers' knowledge, skills and attitude using new technology in teaching. Therefore, teachers especially the older ones and normally with lowest educational background need to be identified, and provided with specially designed training programs, in various forms of new technology courses and workshops.

Differences in the Extent of Barriers of Technology Aided Delivery when Respondents are grouped according to Selected Socio-Demographic Profile

The differences in the extent of barriers of technology-aided delivery of the respondents in their respective schools using the significant value with its corresponding result of probability are shown in Table 5.

Table 5
Differences in the extent of barriers of technology-aided delivery when they are grouped according to selected socio-demographic profile.

Socio-Demographic Profile	T/F Sig. Value	Significant Value	Probability
Sex	-0.119	0.905	ns
Age	0.744	0.527	ns
Salary	2.390	0.070	ns
Number of ICT training attended	6.109	0.003	s

p-value > 0.05 = not significant
p-value < 0.05 = significant

Based on the above result, data showed that there were no significant differences in the extent of barriers of technology-aided delivery when they were grouped according to sex, age, and salary except for number of ICT training attended which was found significant. Their response in the extent of barriers of technology-aided delivery was not affected regardless of their sex, age, and salary. However, teachers' number of ICT training attended influenced their technology-aided delivery. Therefore, the null hypothesis which states that the level of diffusions of technology-aided delivery when they were grouped according to sex, age and salary is accepted while number of ICT training attended is rejected. The result of the study supports the findings of Guzman (2013) that sex does not have a direct effect on innovation integration. There were no critical contrasts between female and male teachers regarding perceived barriers to innovation integration. However, length of service was significant to the barriers of technology-aided delivery. The result of the study negates the findings of Rogers (2019) which states that Younger teachers' perceived equipment, resources, and support as significant barriers to technology integration compared to their older counterparts. The result of the study supports the findings of Scherer et al. (2019) who found out that teachers compensation, which is the last factor discussed within internal barriers, is thought to have a negative effect on perceived usefulness in technology integration based on past experiences. Depending on teachers' past experiences, their compensation was significantly overshadowing the fact that teachers will regard technology as a useful instrument in teaching and learning environments in the future.

Relationship between Diffusions and Barriers of Technology-Aided Delivery of Enablers

Result reveals the relationship between the diffusions and barriers of technology-aided delivery of enablers as shown in Table 6.

Table 6
Relationship between diffusions and barriers of technology-aided delivery of teachers.

Variables	N	Pearson r	Sig. value	Probability
Level of Diffusions Extent of Barriers	177 177	0.204**	0.007	s.

p-value < 0.05 = significant

Data revealed that there was a significant relationship between the diffusions and barriers of technology-aided delivery of the respondents because the Pearson r value of 0.204 had a significance value of 0.007 which was lower than 0.05 alpha. Therefore, the null hypothesis which states that there is no significant relationship between the diffusions and barriers of technology-aided delivery of the respondents is rejected. The result implies that teachers' diffusions of technology-aided delivery is significantly related to barriers of technology-aided delivery. This means that the higher the level of diffusion of technology-aided delivery is, the lower the barriers of technology-aided delivery of the teachers. It implies that the more utilization or disseminations of teachers on the technology as a tool in teaching the less the barriers they experience. It can be said that the more the teachers are utilizing technology in teaching, the less or few they experience problems or

difficulties. The result of the study supports the findings of Hamutoglu (2021) on barriers in technology integration that teachers have faced in the teaching-learning process. The findings, from a sample of 399 teachers across Turkey, show that technology barriers have a direct effect on perceived usefulness, perceived ease of use, dissemination, attitudes, and behavioural intention in technology. Finally, the findings show that technology barriers have a direct impact on integration of technology of teachers. The result of the study supports the findings of Muhametjanova (2014) who identified the barriers and enablers of technology integration according to students and instructors and investigated instructors and instructors' utilization of information and communication technology (ICT) of students in education. The results appear that there is still a need for research facilities, technology information and involvement of teachers, equipment and computer programs, and qualified specialized staff.

Conclusions and Implications

Based on the findings of the study, the following conclusions were drawn: The diffusions of technology-aided delivery of the respondents in the District of Cuartero is manifested in a highly remarkable manner. The teachers in the District of Cuartero experience high extent of barriers in the delivery of technology as a tool in teaching in their respective schools. Age and salary create variation in the level of diffusions of technology-aided delivery. The number of ICT training attended affects teachers' extent of technology-aided delivery in their respective schools. The diffusions and barriers of technology-aided delivery are mutually dependent. The result implies that teachers' diffusions of technology-aided delivery is significantly related to barriers of technology-aided delivery. This means that the higher the level of diffusion of technology-aided delivery is, the lower the barriers of technology-aided delivery of the teachers. It implies that the more utilization or disseminations of teachers on the technology as a tool in teaching the less the barriers they experience. It can be said that the more the teachers are utilizing technology in teaching, the less or few they experience problems or difficulties. They should be part of the implementation of the program for the development and welfare of the school particularly the teachers and pupils. Future studies may be conducted using other variables to further validate the results of the study.

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